ENVIRONMENTAL HISTORY OF THE TITANIUM DIOXIDE PLANT AT AUSTRALIND, WESTERN AUSTRALIA

by

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1. INTRODUCTION

The environment is being increasingly thought of as an economic resource not a dispensable luxury. Environmental impact assessment (EIA) is widely acknowledged as being a basic tool for the assessment of the environmental implications of development proposals[1]. EIA may also reduce management costs, and the time taken to reach a decision, if implemented at an early stage in project planning. The environment is now firmly on the political agenda in both developed and developing countries and there is a growing realization that procedures, methods and techniques to assess the environmental impacts of projects and developments must be given the same emphasis that economic and technical assessments have received in the past[2].

There is to date no general and universally accepted definition of EIA. Definitions which have been proposed include:

> "... an activity designed to identify and predict the impact on human health and well being, of legislative proposals, policies, programmes and operational procedures, and to interpret and communicate information about the impacts."[3]

> "... to identify, predict and to describe in appropriate terms the pros and cons (penalties and benefits) of a proposed development. To be useful, the assessment needs to be communicated in terms understandable by the community and decision makers and the pros and cons should be identified on the basis of criteria relevant to the countries affected."[4]

> "... an assessment of all relevant environmental and resulting social effects which would result from a project."[5]

> "... assessment consists in establishing quantitative values for selected parameters which indicate the quality of the environment before, during and after the action"[6].

Just as the definitions of EIA vary so also does the practice of EIA in different countries. However, in general terms EIA seeks to aid the efficient use of human and natural resources and has proved useful to both those promoting and authorizing developments. If potential

problems are identified early in project planning considerable financial savings may be achieved. Design modifications produced as a result of EIA findings may increase capital costs but it can be argued that savings to local, regional and national economies arising from the avoidance of deleterious impacts and from the maximisation of beneficial impacts will outweigh the costs in the long term. The cost of EIA may even decline once greater information about the social and natural environment is available[7].

SCM Chemicals Ltd, formerly Laporte Australia Ltd, have been manufacturing titanium dioxide from mineral sands in Western Australia since 1964. The plant is located on a site at Australind, approximately 5 km northeast of Bunbury in proximity to the eastern shore of Leschenault Inlet. Since its early days, the plant has been a major source of pollution and environmental degradation due mainly to the disposal of the factory's liquid effluent stream. After many years of investigations and experimentation into alternative methods of waste disposal, a decision was reached in July 1987 to relocate the plant to a site at Kemerton, approximately 14 km north of the Australind site. The new plant will have a greatly increased production capacity and use a different production process. The result will be the conversion of an environmentally undesirable industrial operation into one which is acceptable from an environmental viewpoint.

This development has been the product of a series of studies and investigations. Several committees have been created since the early days of the plant's operations explicitly to seek alternative effluent disposal methods. These committees have all been engaged in environmental impact assessment of various levels. The Company and various Government departments have also contributed to this process. The latter includes the Public Works Department which has been responsible for effluent disposal from the plant. The Environmental Protection Authority, which became involved in 1974, has been a key player in the EIA process since then and will continue to be so in the future.

The purpose of this paper is to demonstrate how EIA can be an ongoing process and to describe the changes that have been introduced into SCM's titanium dioxide manufacturing plant as a result of the EIA process. EIA procedures have been seen to have benefited all parties concerned. The move

to Kemerton of the enlarged titanium dioxide manufacturing plant will be of benefit to the natural environment, the Company, the local community and the State.

2. HISTORY OF THE SCM TITANIUM DIOXIDE PLANT TO 1985

Titanium dioxide is used worldwide as a white pigment for paint, rubber and plastics[9]. Growth in its production was dramatic in the 1950s and 60s when it was displacing the more toxic lead oxides. Titanium dioxide is manufactured from ilmenite and rutile[10], both of which are found in the southwest of Western Australia.

In 1956 the State Government and Laporte Australia Ltd, a subsidiary of the British firm Laporte Industries Ltd, began negotiations to establish a titanium dioxide plant in Western Australia. From the outset the major issue was that of effluent disposal. Information was obtained from the Lincoln County Council in the United Kingdom (UK) about effluent discharge from the Company's Grimsby Plant on the Humber Estuary and from the factory of another company's plant in Tasmania. The State agreed in 1956 to accept full responsibility for the disposal of liquid wastes should Laporte establish at Bunbury. Negotiations lapsed in 1957 when the Australian market was considered inadequate but the State Government continued its evaluation of the industry, particularly with regard to effluent disposal, and arranged visits to both the UK and Tasmanian installations. Negotiations were re-opened in 1960 leading to the Agreement Act of 1961[11].

Under the Laporte Industrial Factory Agreement Act of 1961 the Company was to construct and establish a factory by 1965 capable of producing 10,000 tonnes per annum (tpa) of titanium dioxide. The plant was to be sited at Australind and use the sulphate process. The State agreed to supply the Company with up to 2,000,000 gallons (9,000 kL) of water per day to be obtained from bores. The State also assumed total responsibility for the disposal of all effluent including cooling water from the Company's works, proposing to provide and lay an 18 inch (45 cm) diameter pipeline from the discharge outlets of the Company's pumps across the Leschenault Inlet and Peninsula to a discharge point in the ocean (see Figure 1). The length of the pipeline could not exceed 3½ miles (5.6 km) without the Company's consent and the Company would pay the State $^{3}/_{8}$ of the total cost incurred. The term of the agreement was 50 years[12].

The plant was officially opened in November 1963 and production commenced in January 1964 at a capacity of 10,000 tpa[13]. The capacity of the plant was subsequently increased in 1966 to 12,000 tpa and to 18,000 tpa in 1969[14].

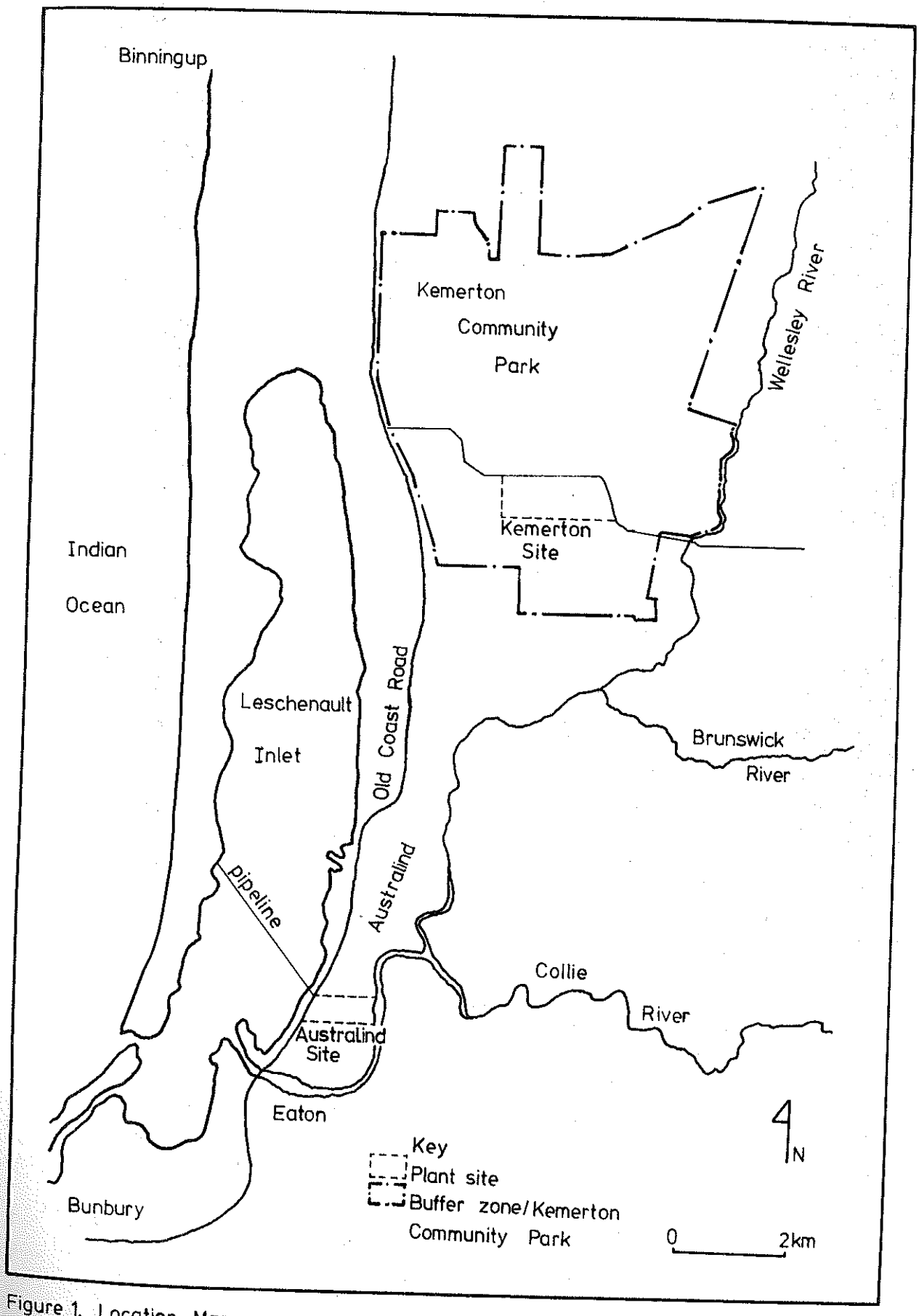

Figure 1. Location Map

The daily effluent discharge was approximately 6,700 kL of liquid waste containing mainly iron (ferrous) sulphate and sulphuric acid. It was discharged into the surf zone in the Indian Ocean on the western side of the Leschenault Peninsula. This method of effluent disposal was based on practises at the Humber Estuary plant in the UK where the tidal range is over 7 m with a maximum tidal flow at the point of discharge of 70,000 kL[15]. However, at Australind, the nearshore areas are characterised by low ocean current speeds and also by white sandy beaches and sea bed, and clear water for a large part of the year.

A relief lagoon was used during days on which northwest winds occurred with the effluent discharged into the ocean from an outlet at the north end of the lagoon when winds changed to southerlies. Early in 1967 the Binningup Progress Association became concerned about the effect of the effluent on marine life. However, it was not until the summer of 1967/68 that serious complaints occurred. The floc of ferric hydroxide formed by the effluent reacting with seawater had moved north staining the water and beach sands at Binningup Beach[16]. On 5th May, 1968 effluent discoloured water was sighted in the Leschenault Inlet. The stain had entered the Inlet under the influence of north-north westerly winds[17]. The Public Works Department (PWD) confirmed the extent of discolouration; recording concentrations of iron as high as 2,000 mg/L just above the ocean bed within 300 m of the outfall. A decision was announced in November 1968 that no further effluent would be discharged directly into the ocean. Lagoon disposal on the dunes of the Leschenault Peninsula was then adopted; beginning with all waste being deposited into the relief lagoon[18].

The relief lagoon only offered a temporary solution to the disposal problem and the use of this area ceased in June 1969. Effluent was then discharged into a lagoon on top of a bare sand dune which acted as a settling pond with effluent overflowing into a second natural depression. From there diesel pumps supplied a perforated pipeline laid on top of the bare sand ridges surrounding the lagoon; the purpose of this being to provide as much contact time as possible with the calcerous sands. The scheme was monitored by bores. The use of the settling pond and the perforated pipeline ceased in September 1969. In August 1970 the PWD sought advice as to the feasibility of disposing of part of the effluent by directly injecting it down specially constructed deep bores. In December 1970 a decision was made to develop a new

disposal area to the north of the existing system[19]. To undertake this dune disposal it was necessary for the State to increase the length of the pipeline. The Company viewed its obligations as being restricted to the pipeline specified in the Agreement Act but nevertheless contributed the $^{3}/_{8}$ of capital costs to all extensions of the pipeline[20].

The most successful means found for the disposal of effluent into the dunes has been the use of lagoons as infiltration ponds. When effluent disposal into a lagoon commences there is a rise in the water table resulting in the creation of a groundwater mound in the Safety Bay Sands aquifer. The effluent usually sinks to the bottom of the aquifer and then moves away in response to the hydraulic gradient and gravity. While moving through the aquifer, the effluent reacts with calcium carbonate forming gypsum, iron precipitate and carbon dioxide. The neutralised solution remaining contains iron and continues to move in response to the hydraulic gradient until it discharges into the ocean causing some staining. Sometimes effluent is able to migrate down to the Tamala Limestone aquifer where similar reactions take place. As the calcium carbonate in the vicinity of each lagoon is exhausted the amount of unneutralized effluent in the system grows. The use of a lagoon is usually discontinued when excessive ocean staining occurs, adverse effects on vegetation are detected or staining of the Inlet is observed or predicted[21].

A proposal was received in 1974 from Laporte to double the factory output to 36,000 tpa of titanium dioxide. This increased the need to find a satisfactory effluent disposal solution.

The Laporte Industrial Factory Agreement provided that the effluent from the Bunbury plant shall not differ in material respects from the 1961 discharge from the Company's factory at Grimsby in the UK. Thus, the proposed doubling of the Bunbury plant output would double the volume of effluent produced and the volume of water supply required. Negotiations with the Company resulted in agreement to operate with the same quantity of water thereby increasing the concentration of the effluent. Laporte agreed to make an annual payment to the State of $35,000 in consideration of savings to the Company in not having to construct a second pipeline[22].

Direct discharge of raw effluent into the Inlet has resulted from breakages in the main pipeline crossing the Inlet and the dunes. There are 50 recorded instances of such spills in the 10 years preceding 1985. The more severe spills have resulted in fish kills and destruction of the benthic biota in the immediate vicinity of the discharge. Studies initiated by the PWD have indicated that the effects on benthic biota, fish and crabs are short lived[23].

In 1983 it was recognized that more disposal lagoons and hence more land on the Peninsula would be needed. Cabinet made funds available to purchase additional land; 100 ha of which was to be used for waste disposal in the short term[24].

In September 1984 SCM Chemicals Ltd purchased the titanium dioxide plant from Laporte[25].

In November 1984 a kilometre long red stain was discovered in the Leschenault Inlet opposite the plant and it was revealed that contaminated groundwater had been seeping into the Inlet for at least four years. A drilling survey on the Australind site found groundwater contamination to be far more serious and widespread than expected. The Company had sunk six bores several years earlier but contamination was finding its way past the bores and into the Inlet. However, there was no evidence to indicate leaching of pollutants into the Collie River. Three major sites under the plant were identified as being polluted; under the main plant, under the old sulphur dump near the main plant and under the old tip at the rear of the site near the Collie River[26].

In May, 1985, SCM Chemicals released the Summary of a report entitled "Groundwater Contamination Study", but the report itself was not made available for public scrutiny. The Summary identified a total area of 55 ha which was contaminated. Under the main plant about 22.7 ha of contaminated groundwater accounted for the equivalent of 1740 tonnes of concentrated sulphuric acid. The contaminated groundwater was trapped on an impervious layer of clay ranging from 6 to 30 metres below the surface. Six domestic bores to the north of the plant site which were contaminated were replaced by the company. The Summary clearly stated that groundwater contamination was strictly confined to the shallow sands under the plant site and had not extended into the Leederville aquifer formation which is a domestic groundwater source. It was revealed that 83 exploratory bores had been drilled to trace pollution and the first de-watering bores were in operation by the end of June 1985.

Under the main process factory site 250 kL/day is extracted and included with the process water, outside the factory site north of the main processing area about 750 kL/day is discharged to the Peninsula pipeline and at the waste dump, 300 kL/day is chemically treated then infiltrated into the ground[27].

3. EARLY REVIEWS OF THE LAPORTE INDUSTRY

The Laporte Effluent Disposal Committee was formed in 1970 with representation from the PWD, Laporte Australia Ltd, Government Chemical Laboratories and the Coordinator of Development. The broad terms of reference of the Committee were to investigate alternative methods of disposal of the Laporte effluent including pipeline and dump barges, marine pipeline, injection wells into saline aquifers and chemical treatment for removal of iron[28].

In the first of these options a pipeline would convey the effluent to a holding sump at Bunbury Harbour where it would be transferred to barges and dumped beyond the edge of the continental shelf approximately 90 km offshore. The strong effluent containing 100% of the iron and 98% of the acid would be disposed of in this way and the remaining weak effluent would be discharged on the Peninsula. The major disadvantages of this option were environmental problems associated with deep sea fish on the edge of the continental shelf, cost, interruption posed by inclement weather and possible industrial disputes, and pipeline hazard since the pipe from the Australind site to the harbour would pass through wildlife and tourist areas[29].

A survey undertaken for a possible marine pipeline disposal system indicated that ocean disposal would have to be at least 20 km offshore to ensure that no beach staining occurred. However, the cost of such a pipeline and its associated operating costs were considered to be too high[30].

The Geological Survey carried out preliminary investigations of bore injection of effluent into deep saline aquifers. At a depth of 1,800-2,100 m it was considered that injection would affect potable water supplies at 600 m. A deeper stratum at 4,500 m contained porous sands mixed with calcerous deposits which would react with sulphuric acid to form gypsum and consequently block the injection system. Such an option could not be considered further until further investigations were carried out[31].

Chemical treatment studies concluded that the recovery and reuse of sulphuric acid provided the only long term effective and aesthetically acceptable solution. The preoxidation of ferrous to ferric iron would largely prevent escape of iron in solution from the dune sands. However, the oxidation process was extremely slow in acid solution. It was recommended that investigations be conducted into the nitrogen dioxide catalysed oxidation of the effluent[32].

The Laporte Industrial Factory Agreement Review Committee was founded in January 1974 to consider the recommendations of the Laporte Effluent Disposal Committee and to review any changes necessary to the Agreement to provide for disposal at sea and to facilitate negotiations with the Company concerning cost sharing responsibilities[33]. In February 1974 the matter of the Laporte effluent was referred to the Environmental Protection Authority (EPA) by the then Minister for Development and Decentralisation[34].

Ocean investigations in 1974 using self recording current meters showed that wind driven currents and associated velocities 5-6 km offshore from Bunbury might be adequate to disperse effluent discharged in that zone. The approach would be to dispose of effluent by dispersion and dilution. In view of these factors the Review Committee recommended to the Government that a decision on barging be deferred, that the Government and the Company jointly finance a major investigation programme and that a report be produced recommending long term effluent disposal methods. The approved investigation provided for the study of all options without bias and was originally scheduled for finalisation by 30th June, 1976 but the completion date was progressively postponed as further studies became necessary[35].

In March 1975 the EPA indicated a preference for ocean disposal of the plants wastewater beyond the continental shelf[36]. In April 1975 the PWD installed a 50 mm diameter experimental ocean bed pipeline to carry 5% of the full production flow of concentrated effluent to a discharge point 5.5 km offshore in 16.5 m water depth[37]. The EPA felt that the pipeline was likely to cause problems of beach and ocean staining by effluent and accordingly set two broad criteria for an ocean pipeline:

- No significant adverse effect on marine life; and
- No discolouration of water or beaches visible from the shore.

The EPA also set up an ad hoc committee to advise on marine studies for an ocean pipeline[38].

The trial pipeline outlet was deliberately directed onto a colonised area of the sea floor where damage might occur and could be measured. Experimentation commenced in February 1976 and continued until April 1978 when damage caused by Cyclone Alby lead to the termination of the trial. It was concluded that under the discharge of the total volume of effluent there would be toxic effects over 200 ha causing complete denudation and a further area of about 1000 ha in which the behaviour of fish would be affected, most likely leading to their exclusion[39].

In December 1976 the EPA provided comment on criteria for the existing practice of dune disposal proposed by the Laporte Industrial Factory Agreement Review Committee. The EPA considered that dune disposal should also meet the criteria specified by the EPA in April 1975 for ocean disposal[40]. The EPA considered the following criteria acceptable:

- Produce no pollution of aquifers with potential to meet Bunbury, Eaton and Australind's domestic and industrial water supply;

- Produce minimum changes in the quality of the existing fresh water soaks and seeps in the sand dunes so that the biology of the wildlife dependent on them is not affected.

- Produce minimum seepage of diluted and neutralized effluent to the Leschenault Estuary and certainly produce no staining or seepage which would affect the biology of the estuary[41].

In August 1982 the Laporte Effluent Disposal Committee's report entitled "Laporte Factory Effluent Disposal - Report on Disposal Options" was forwarded to the EPA for consideration[42]. In this report it was concluded that both chemical treatment and barging of effluent were prohibitively expensive and did not in themselves provide a total solution. A range of options were identified for effluent disposal but no single option was clearly superior. The report considered the best option to be continued dune disposal in conjunction with injection and marine pipeline discharge. This would involve separation of the effluent within the factory into a weak and strong effluent and

disposal individually of the separated streams. The stream containing 75% of the total effluent volume but only 5% of the iron and no suspended solids could be discharged to the ocean with the balance of the effluent being discharged into the dunes and deeper limestone aquifer. This would necessitate factory modification as well as a duplicate pipeline across the estuary. The report made the following additional recommendations:

- Access to additional land on the Leschenault Peninsula north of the existing disposal area be secured immediately;

- Detailed studies be undertaken to determine the works required within the factory and beyond to enable the effluent to be handled in segregated streams;

- Field tests to confirm the feasibility of long term bore injection of concentrated effluent into the limestone be continued and accelerated;

- That investigations be undertaken to gain a better understanding of the mechanism of the visibility of iron floc in the sea water[43].

The report also considered changing the plant's production method to the chloride process. This requires rutile feedstock which is a higher grade titanium dioxide ore. However, rutile supplies were limited and the price high compared with the more stable ilmenite supply and the construction of a chloride plant would be expensive. It was recommended that the adaptation of the chloride method to use ilmenite or upgraded ilmenite be examined[44].

After receiving public submissions on this report the EPA responded in May 1983 in a bulletin entitled, "Evaluation of Disposal Options for Effluent from Laporte Titanium Dioxide Manufacturing Plant". The fundamental outcome of this was that the EPA preferred to nominate a strategy for future effluent disposal rather than a particular option. A strategy can be more flexible being composed of many options or elements. In choosing a preferred strategy, it was considered necessary to make judgements as to the relative significance of environmental impacts of various options on the terrestial, marine and estuarine environments. The preferred strategy was as follows:

- Effluent disposal into the dunes should cease as soon as possible;

- Minimum discharge of iron through an ocean pipeline greater than 5.5 km in length;

- Separation of solids and copperas from the effluent stream for landfill disposal; and

- Production and regular review of an environmental management programme which details monitoring, rehabilitation and other means for ameliorating adverse impacts.

The EPA also recommended consideration of the following:

- Codispersal of copperas and solids with flyash from the proposed Bunbury power station and/or with red mud from alumina production;

- A programme for reduction of iron loadings in the effluent;

- Assessment of the feasibility of disposal of liquid effluent with cooling water from the proposed Bunbury power station; and the

- Feasibility of acid recovery and chemical treatment of strong effluent[45].

The EPA acknowledged that the preferred strategy would require either the goodwill of the Company or otherwise ammendments to the 1961 Agreement Act. The benefits of the strategy are that it aimed to reduce pollutant loadings, ocean discharge would be possible with copperas removal, the Leschenault Peninsula could be made available for more appropriate uses such as recreation, the risk to the Inlet from effluent disposal practices would be minimal and very little further impact on the ecology of the Peninsula would occur. Finally, the EPA recommended that once a decision had been made on a preferred option, the EPA's advice should be sought on requirements for further environmental assessment[46].

4. RECENT ENVIRONMENTAL IMPACT ASSESSMENT

The environmental assessment of Laporte/SCM's operations entered a new phase in 1984/85. In January 1984 a joint

submission on effluent disposal was presented to Cabinet by the Minister for the Environment, the Minister for Minerals and Energy and the Minister for Water Resources[47], and in September SCM Chemicals Ltd commenced a 12 month feasibility study on conversion to the chloride process[48].

While this was occurring Laporte/SCM submitted a Stage I Environmentmental Review and Management Programme (ERMP) to the EPA, in January 1985. The ERMP was subsequently released for public review and comment. This action was endorsed by Cabinet[49].

The purpose of the ERMP Stage I was to assess the environmental implications of the various long-term effluent disposal strategies based on current knowledge and with consideration given to various social, economic and environmental issues. The report was commissioned by the Laporte Steering Group (LSG) which was formed in 1983 when Cabinet terminated all of the other Laporte committees and subcommittees[50].

In the Stage I ERMP it was stated that new titanium dioxide plants constructed during recent years had used the chloride rather than the sulphate process. Company personnel advised that it would be technically possible to change the 'front end' of Laporte's factory to the chloride process whilst maintaining the existing product treatment facilities. If so the volume of effluent would be greatly reduced to 1,000-1,800 tpa ferric chloride and air emissions of sulphur dioxide/trioxide would be largely eliminated. However, the capital expenditure on a change to chloride technology could not be justified on environmental grounds alone. It was proposed that a substantially larger plant of approximately 50,000 tpa titanium dioxide was required[51].

In the ERMP it was concluded that dune disposal of effluent had a limited life in the currently available areas. An attractive solution would be to change to the chloride process but this would require an increase in plant capacity. If it was not feasible to make this change, then ocean disposal was considered the only practical alternative for the weak effluent. Co-disposal with alumina refinery red mud was considered the most favourable long term treatment for strong effluent and deep well injection was a potential alternative[52].

It was pointed out that the commitment by the State to accept responsibility for Laporte's effluent disposal was

made in good faith when long term environmental implications of disposal were not fully understood, environmental protection was of little concern to the community and when the comparable Laport plant at Stallingsborough in the UK was satisfactorily, discharging its effluent in an apparently similar manner, but was in retrospect, under greatly different circumstances. On this basis a case could be made for the Company to accept more responsibility for future waste disposal[53].

It was also stated that the vegetation of the Peninsula, particularly the woodlands to the north, are of high conservation value and continued northern expansion of effluent disposal would degrade these areas and conflict with conservation, tourism and recreation values. It was felt that increasing population of the Greater Bunbury Region will mean that the Inlet and Peninsula will increase in significance as a scenic and recreational resource to the local and visiting population[54].

In 1985 a report on environmental management proposals for dune disposal to 1987-88 was completed by the PWD and submitted to the EPA for comment.

The EPA responded to the Minister for Minerals and Energy on the ERMP Stage I in late 1985[55]. The EPA did not issue an assessment report but provided some guidelines and comments. In this guidance the EPA stated that it strongly supported the Cabinet commitment to eliminate the present dune disposal of effluent. The EPA also stated that in principle, it supports the manufacture of titanium dioxide pigment, providing it does not produce any waste disposal problems[56].

At the same time as the above process was occurring the Leschenault/Kemerton Regional Park concept was presented in draft form for public comment. This concept had the aim of producing a land use plan for the Leschenault Peninsula (and Kemerton) which accommodated Government commitments and maximised benefits to the State and local communities. The draft report was published by the South West Development Authority. The terms of reference of the report were as follows:

> "To identify opportunities for development of the Leschenault Peninsula/Kemerton area to accommodate tourism, recreation, conservation and rehabilitation, giving due recognition to the short term requirements for effluent disposal and to the potential for the future siting of a smelter. To reflect in development plans the opportunities and constraints of the land and the Leschenault Inlet and to maximise potential benefits to the State and local people. To facilitate public involvement through a one month public review period and through a seminar, public meetings and consultation with the local community and other interested parties during the period of plan preparation and review."[57].

In May 1986 SCM Chemicals Ltd submitted a Notice of Intent to the EPA in which it was proposed to construct a new chloride based titanium dioxide plant. The EPA requested that an ERMP be prepared (the ERMP Stage II). This report was released for public review in November 1986[58].

The Stage II ERMP proposal involved the following:

- Construction of a titanium dioxide manufacturing plant based upon the chloride process;
- Construction of a chlor-alkali plant of 12,000 tpa capacity to provide the chlorine required;
- Construction of an air separation plant to supply oxygen and nitrogen to process at a capacity of 44,000 tpa of oxygen;
- Decommissioning of the existing sulphate process;
- Continued use of the existing finishing plant at Australind;
- Use of rutile or synthetic rutile as the raw material;
- Disposal of small quantitites of used chlorinator brickwork and process components that are mildly radioactive by burial at the mineral sand mines at Capel;
- Disposal of 60 tonnes per day of neutral solid by burial; and
- Disposal of 4,500 kL/day of a clear, neutral, non-radioactive brine by infiltration at the plant site[59].

Construction would extend over a two year period with commissioning scheduled for the end of 1988. The sulphate and chloride plants would operate concurrently for a period of one year. The proponent made the following commitments to environmental management:

- Dust and noise during construction would be controlled;.
- Noise would be maintained at levels that would not create a nuisance to surrounding areas;
- The plant would be aesthetically designed and landscaped;
- All waste products would be safely disposed of and all practicable safety features would be incorporated into the design;
- A hazards and operability study (HAZOP) would be undertaken for the plant and all personnel would be trained in safe work practices and emergency procedures[60].

The capital cost of conversion would be $70 m for a plant with a capacity of over 50,000 tpa titanium dioxide. Storage of chlorine would be in 2 refrigerated tanks of 25 tonnes capacity maintained at -34°C with a further tank as a standby. The chloride process plant would require 2,520 kL of water per day to be extracted from deep bores with an additional 480 kL/day supplied to ancillary processes.

Liquid wastes from the project would be 2,520 kL of process water per day containing chlorides of iron, manganese, vanadium and unreacted ore, unreacted coke and sodium salts; 2,220 kL/day ofgroundwater from the contaminant recovery programme (extracting and treating polluted groundwater from beneath the works site) and blow down and cooling waters; 60 kL/day of acidic and alkaline liquors produced during regeneration of ion exchange columns in the brine purification section of the chlor-alkali plant and sulphuric acid bled from the chlorine drying tower to be used elsewhere. All liquid wastes and contaminated groundwater would be collected and neutralized by lime addition which would raise the alkalinity and precipitate most dissolved salts and the solution would then be re-neutralized. The solids would be separated in a clarifier which would produce two wastewater streams. An overflow of 4,500 kL/day of neutral brine at a temperature of 35°C which would be

discharged by gravity to the Collie River and an underflow of 300 kL/day of neutral brine containing approximately 60 tonnes of suspended solids. The suspended solids would be discharged to infiltration ponds, dried and then buried[61].

The chloride process would release 34,000 tpa of carbon monoxide and carbon dioxide and 60,000 tpa of nitrogen. Any other gases that might be produced in the event of a malfunction would be scrubbed. Any gaseous stream contaminated by chlorine would be directed to a caustic soda scrubbing tower. Treated discharge from this tower would contain 1-5 ppm chlorine. Hydrogen gas would be vented if no other uses were found and discharged to the atmosphere. Gaseous emissions from the air separation plant would be released to the atmosphere[62].

The beneficial impacts foreseen included:

- Cessation of waste water disposal on the Peninsula;
- Cessation in time of beach staining;
- No further pollution of the Inlet from pipeline failure;
- Ability to rehabilitate and stabilize the coastal environment; and
- Improved air quality due to a reduction in the sulphur containing emissions[63].

The trade-off for these environmental gains would be the risk associated with the use of chlorine. Chloride process plants handle sufficient quantities of toxic chlorine and titanium tetrachloride to impose some risk outside the plant boundary in the event of a major loss of containment. The preliminary assessment of this risk concluded that an individual fatality risk of 1 in a million per year (for chlorine storage of 50 tonnes on the Australind site) extends slightly into the Australind residential district and 3 houses exist in the zone of risk between 1 and 10 in a million. A risk assessment study was completed by Cremer and Warner in 1986. The proponent would undertake a risk assessment of the proposal at the completion of the final design in order to confirm or improve upon the results presented in the Cremer and Warner study[64].

In December 1986, the State implemented an agreement with SCM Chemicals Ltd entitled "Pigment Factory (Australind)

Agreement Act". The Act terminated the 1961 Agreement and allowed SCM to use the sulphate plant until the changeover date which was set for the 31st December 1989. The State would remain totally responsible for the disposal of all the sulphate process effluent at the cost of the Company. The Company would maintain, repair and renew the pipeline and its support structure at its own expense and pay to the State $100,000 each financial year until 90 days after the changeover date. According to the new Agreement Act, the Company would be bound by any recommendations of the EPA subject to Cabinet approval and during the continuance of the Agreement would investigate the technical, economic and environmental feasibility of converting the sulphate plant to the processing of other raw materials. In consideration of the Company agreeing to cancel the 1961 Agreement Act and releasing the State's obligation to fund waste disposal, the State would pay the company $8,500,000 by the changeover date[63].

In May 1987 the EPA released its report and recommendations on the Stage II ERMP in a bulletin entitled "Proposed Chloride Process Titanium Dioxide Plant at Australind". In regard to the history of the sulphate process plant's operation, the EPA concluded that; "from an environmental viewpoint it would have been inappropriate to initially locate the plant at Australind. However, given the location, development in proximity to the plant is unfortunate from an environmental planning perspective." The EPA also stated that the ongoing environmental management of the existing plant had been inadequate and did not provide a basis for confidence in the future. Problems have been exacerbated because the company is effectively outside the environmental laws applying to other industries in the State. After assessing the Stage II ERMP, the EPA came to the following additional conclusions:

- The Australind site could be made environmentally acceptable;
- That additional safeguards were required;
- That if the proponent's safeguards and the EPA's recommendations were implemented then the risks generated would be low enough to be acceptable to the EPA;

- That with appropriate conditions, wastewater discharge could be managed in an environmentally acceptable manner; and

- That provided the EPA monitors all stages of construction and management, the proposed plant could be satisfactory environmentally and riskwise[66];

The EPA also pointed out that the operations of the sulphate plant were exempt from the 1971-1980 Environmental Protection Act and remain exempt from the provisions of the Environmental Protection Act of 1986 until the revised agreement between the Company and the State is implemented[67].

The EPA was not completely satisfied with the proposal but believed it could be made acceptable subject to their recommendations. One benefit of the project is that it would have to comply with the Environmental Protection Act (1986) as determined by the Pigment Factory (Australind) Agreement[68].

The EPA made a series of observations and recommendations regarding the Stage II ERMP which are summarised below.

The EPA recommended using the existing lagoons until December 1989 even with the slight possibility of staining local beaches, rather than open up new lagoons in environmentally sensitive areas to the north of the existing lagoons. The unused lagoons were oversaturated and have impacted upon the surrounding vegetation in places[69].

The EPA recommended that a condition of approval be that the existing plant should not operate beyond 31st December, 1989 (or at an extension of time determined under section 8 of the Pigment Factory (Australind) Agreement 1986). Complaints by residents living near the existing sulphate plant had been made since the plant commenced operations in 1964. The complaints included reports of choking gases that cause severe irritation of the eyes, nose, throat and skin and severe corrosion damage to property and motor vehicles. These complaints were considered to be justified by Clean Air officers monitoring the plant in the early 1970s who found evidence of severe property damage by sulphuric acid mist[70].

The ERMP stated that "the proponent would explore productive ways of utilizing the redundant sulphate equipment"[71]. The EPA preferred that the redundant sulphate process equipment not be utilized for any purpose at the Australind site[72].

The EPA acknowledged and accepted the Cremer and Warner risk analysis but recommended that a HAZOP study be completed and submitted before construction commences and be conducted in a manner approved by the EPA. The EPA believed that the proposed plant could be operated with 25 tonnes of chlorine storage and recommended this as a maximum storage amount. The EPA also recommended that no chlorine from the site be sold and that no transport of chlorine to and from the site except during the commissioning stage should occur. The EPA investigated the safeguards required for chlorine storage and recommended installation of full height concrete bunding, insulation tiles in the bunds, a foam suppression system and isolating valves on the main storage tanks. The EPA recommended that the company should be responsible for the environmental performance of the chlor-alkali plant even if its management is subcontracted out. The EPA also recommended that the proponent's emergency plan be integrated with the State Emergency Services (SES) Bunbury Regional Counter Disaster Plan, that risk levels should never exceed those presented in the ERMP and that no residential area occur within the 1 in a million per person per year risk contour. Almost all of the houses in the Australind area fall outside the 1 in a million risk contour for the proposed plant. Three houses occur in the area of risk greater than 1 in a million but less than 10 in a million and the EPA recommended that the Government enter into discussion with the owners to ensure they would not be unreasonably disadvantaged should the proposal proceed[73].

The EPA also made the following recommendations:

- That the existing pipeline across the Inlet should be maintained for possible ocean disposal if the monitoring results of wastewater effluent discharge to the Collie River are not to the EPA's satisfaction;

- That the proponent install a scrubbing system on the chlor-alkali plant capable of absorbing all the chlorine produced at full production for one hour; and

- That the licence fees payable by the proponent should help to meet the costs of EPA monitoring[74].

In June 1987 an amendment to the Pigment Factory (Australind) Act 1986 was released. This announced a change in the site from Australind to Kemerton and an extension of the changeover date to 30th June, 1990. Plant production was increased to 70,000 tpa with the finishing plant remaining at Australind. In consideration of the company agreeing to relocate the chloride plant to Kemerton, the State would pay the Company $6,350,000 by 31st July, 1990. The State would also purchase SCM's land at Australind at the closure of the sulphate plant for $650,000 and lease back areas which are still needed for the ongoing operation[75].

The EPA determined that the degree of assessment required for this proposal should be at the Notice of Intent (NOI) level since the Australind proposal had been previously examined in detail and was very similar to the new proposal. Furthermore, the EPA had previously assessed a proposal for an aluminium smelter at the Kemerton site and had presented a detailed assessment report[76].

According to the NOI, discussions with the State removed any economic impediments against the consideration of Kemerton as an alternative site. Kemerton is 55 ha in area and is located 14 km north of the Australind site[77].

The Kemerton proposal was as follows:

- Construction of a 70,000 tpa titanium dioxide manufacturing plant at Kemerton based upon the chloride process;
- Construction of a 12,000 tpa chlor-alkali plant at Kemerton with 100 tonne refrigerated chlorine storage in three 50 tonne tanks (one tank would be on standby);
- Construction of an air separation plant at Kemerton to supply 42,000 tpa of oxygen and 60,000 tpa of nitrogen;
- Approximate doubling of the existing finishing plant at Australind;
- Decommissioning of the existing sulphate process plant at Australind which would be investigated for alternative process use in the future;
- Continuation of the existing sulphuric acid plant at Australind;

- Disposal of 4,800 kL/day of treated wastewater (including contaminated groundwater) at 30-32°C into the Collie River;

- Disposal of 2,700 kL/day of treated saline wastewater into the Wellesley River via a 1.5 km drain;

- Disposal of 40 tonnes/day of material to be removed with 30% solids for burial offsite from Australind;

- Disposal of 226 tonnes/day of material to be removed from Kemerton with 30% solids for burial either at Capel or at an area east of the Wellesley River; and

- Disposal of a small quantity of mildly radioactive waste from Kemerton by burial offsite[78].

The plant would be provided with various emergency relief systems. In the original Australind proposal these were to involve passing relief gas streams through appropriate scrubbing devices before release to the atmosphere. In the NOI proposal it was planned to exhaust such emissions through an emergency emission control without a scrubbing system to an appropriate height release stack. The original proposal included a building to house the chlorination purification and storage units to reduce the risk and nuisance to close neighbours. This was considered unnecessary for the Kemerton site especially given that it would increase the safety risk to employees. The Company proposed to continue using the sulphuric acid plant at the Australind site as a source of steam for the finishing plant. According to the NOI, use of the redundant sulphate plant assets formed an integral part of the plant conversion economics and any future uses for this plant would be considered[79].

The EPA was advised by the Minister for the Environment that its assessment of the NOI proposal was required by 16th July, 1987. The EPA then:

- Consulted the Harvey Shire Council on the best means of obtaining public input;

- Provided input to the summary of the company's NOI which the Council made available to all surrounding residents;

- Made copies of the NOI available at local public libraries and the Council chambers;

- Organised a public meeting. The proceedings were taped and transcripts used as submissions; and

- Forwarded copies of the NOI to all relevant government agencies for comment.

The EPA received 38 written submissions from the public and Government departments in addition to the transcript of the public meeting[80].

The EPA concluded that the development of a chloride-process titanium dioxide plant at the Kemerton site would generate environmental impacts including: construction phase impacts, impacts of risk and hazard, other environmental impacts due to the emission of wastes, environmental impacts due to water resources extraction and occupational health and traffic impacts. The EPA recommended that a HAZOP study be completed and submitted to the EPA before construction commences, that a final risk analysis report incorporating the plant design after the HAZOP study be submitted soon after construction, that a hazard analysis be submitted before plant commissioning and an audit of risk and hazards be submitted to the EPA upon request[81].

The EPA concurred that due to the adequate buffer zone of approximately 2 km radius at the Kemerton site it may not be necessary to have all of the safeguards initially proposed for the Australind site. However, given the similarity of the buffer zone distance at the Kwinana industrial area, an equivalent degree of safeguards should be required. The EPA decided that this matter could best be resolved at the HAZOP analysis stage. The EPA recommended, as for the Australind proposal, that there be no sale of chlorine from the Kemerton site without further specific EPA assessment and that no more than 50 tonnes of chlorine should be stored at Kemerton in containers not exceeding 25 tonne capacity. Subcontracting the chlor-alkali plant at Kemerton would be acceptable to the EPA but it recommended that the proponent be held responsible for environmental performance. The EPA recommended that the proponents emergency plan be integrated with the proposed SES Bunbury Regional Counter Disaster Plan[82].

The EPA concluded that the proposal to discharge wastewater into the Wellesley River was unacceptable and recommended that the proponent investigate alternatives such as ocean discharge or deep well-injection. It was also recommended that a chlorine scrubbing system be installed on the

chlor-alkali plant with sufficient back up to be able to absorb all of the chlorine produced during one hours production and that the company's proposal for solid waste management and disposal be submitted for EPA assessment prior to completion of construction and that the solid waste disposal sites be approved by the appropriate Government agencies, including the Radiological Council[83].

The EPA was informed by the Water Authority of Western Australia that there would be adequate fresh water available for the proposed plant at Kemerton; however, insufficient detail had been provided for the EPA to advise on water supply. Consequently, the EPA recommended that a detailed water supply proposal be referred to the EPA for assessment[84].

It was also recommended that the existing sulphuric acid plant and the existing sulphate process plant at Australind should not operate beyond 30th June, 1990 and that until 30th December, 1987 the sulphur dioxide emissions should not exceed 1000 $\mu g/m^3$ averaged hourly and from 1st January, 1988 those emissions should not exceed 1000 $\mu g/m^3$ at any time in any residential area[85].

Finally, the EPA again recommended that the proponent be required to meet the reasonable costs associated with monitoring the environmental performance of the construction and operational phases of the Australind and Kemerton plants[86].

5. DISCUSSION

The history of the SCM titanium dioxide plant at Australind is a good example of EIA as an ongoing process rather than one that starts with a proposal and ends with the decision to go ahead. EIA should not be limited to the production of a PER or ERMP compiled at one point in time and which serves as a tool for decision-making purposes, but should be a continuing activity involving the entire community.

In the SCM case there has been a series of environmental impact assessments, some of which involved the public. The PWD has been responsible for effluent disposal from the sulphate process plant at Australind and has sought alternatives and refinements to the dune disposal method. The Laporte Effluent Disposal Committee, formed in 1970, investigated alternative methods of effluent disposal including pipeline and dump barges, marine pipeline deep-well injection and chemical treatment. The Laporte Industrial Factory Agreement Review Committee, founded in 1974, was formed to consider the recommendations of the Laporte Effluent Disposal Committee and to review changes necessary to the Agreement Act 1961. These early reviews can all be regarded as informal environmental impact assessment.

The matter of Laporte's effluent was referred to the EPA in 1974; the Authority indicated preference for ocean disposal of the plant's wastewater in 1975 and set two broad criteria for an ocean pipeline. The EPA also set up an ad hoc committee to advise on marine studies for an ocean pipeline and, in 1976, provided comment on criteria for acceptable dune disposal. In 1983 the EPA responded to the report of the Laporte Effluent Disposal Committee and nominated a preferred strategy for effluent disposal rather than a particular option. This strategy included a preference to cease dune disposal as soon as possible. The stage was then set for a more formal approach to EIA.

Cabinet terminated all of the Laporte committees in 1983 and established the Laporte Steering Group (LSG) which had the objective of terminating waste disposal on the Leschenault Peninsula, reviewing disposal options and implementing the preferred disposal option. The LSG was also to investigate and implement rehabilitaiton of the Peninsula and ensure that effluent disposal would conform with the advice of the EPA. The Stage I ERMP commissioned by the LSG was submitted to the EPA who did not issue an assessment report on the

Stage I ERMP but provided some guidelines and comments to assist with further studies.

In May 1986 SCM (now the plants owners) submitted a Notice of Intent to the EPA for the proposed conversion of the Australind plant to the chloride process. The EPA requested that an ERMP be prepared. This lead to the release of the Stage II ERMP in November 1986. EPA assessment of the proposal took into consideration 51 submissions. The EPA indicated a preference for the existing and proposed plant to be relocated elsewhere but concluded that the Australind sit could be made environmentally acceptable subject to strict control.

In December 1986 the State terminated the 1961 Agreement and implemented a new agreement with SCM (Pigment Factory (Australind) Agreement Act). This Act was subsequently amended in 1987 when the Kemerton site was made available to the Company.

SCM released its NOI for a 70,000 tpa chloride process plant at the Kemerton site in June 1987. The NOI was made available for limited public review; a public meeting was also held. The NOI assessment was able to short circuit some of the EIA procedures since the Kemerton proposal was essentially the same as the previous Australind proposal and the Kemerton site had previously been assessed for an aluminium smelter. Although new predictions were made, a quick evaluation was possible. The EPA assessment of the Kemerton proposal will lead to the solution of the dune disposal problem on the Peninsula and the eventual cessation of sulphurous air emissions at Australind. The ongoing environmental impacts of effluent disposal and air emissions will be replaced by an acceptable risk impact due to chlorine and titanium tetrachloride storage. The Kemerton proposal requires the disposal of 4,800 kL of liquid effluent per day, including 1,800 kL of contaminated groundwater from the Australind site and 2,700 kL from the Kemerton site. In each case the effluent stream will be a clear brine. The Australind site effluent will be discharged into the Collie River and the Kemerton site effluent with the existing plant which generates approximately 6,700 kL of liquid effluent daily (for only half the quantity of titanium dioxide produced) and which is disposed of in the dunes on the Peninsula. When the groundwater contamination recovery programme is ended, and if the finishing plant is moved to the Kemerton site, water consumption could be

further reduced and effluent streams could be recycled and reused.

Closure of the existing sulphate process plant will end the sulphur dioxide emissions which have been a source of complaint, particularly from residents of Australind. The air emissions from the Kemerton proposal are carbon monoxide and dioxide, nitrogen and hydrogen.

The EIA process has not only been the driving force behind this solution to the environmental problems associated with the sulphate process plant but has assisted in other ways. The Company will benefit by its move to Kemerton by ending its dependence upon outmoded and non-competitive technology and by doubling its production output. Furthermore, the new plant will have probably the most competitive technology and be one of the biggest in the world. The Company will have fewer planning constraints at the Kemerton site due to the presence of a suitable buffer zone.

The local community will benefit in a number of ways. The dunes on the Peninsula can be rehabilitated when disposal ceases and public access to this area can then be made available. The visually obtrusive pipeline across the Leschenault Inlet may also be removed. Termination of the sulphurous emissions will benefit the local residents and part of the Australind site can be rehabilitated and given a more appropriate land use. These gains have been facilitated by the involvement of the local community from individuals up to the Harvey Shire Council.

The State will also derive certain benefits from the Kemerton proposal. There will no longer be the problem and expense associated with effluent disposal from the sulphate process plant. The doubling of titanium dioxide output will increase the value added which comes to WA and the State will benefit by hosting one of the biggest and most competitive plants in the world. The State has also demonstrated that it can take advantage of market opportunities and do so very quickly. Furthermore, the State will benefit socially and economically by improved land use in the Australind district.

This study clearly demonstrates that EIA is not a hindrance to development. The EIA process has served as a driving force behind social and economic, as well as environmental benefits. Compared with the existing and proposed plant at

Australind the Kemerton proposal will achieve significant environmental and economic advantages by facilitating the environmentally preferred alternative with a larger plant. The social environment will also significantly benefit. The new plant whilst doubling the existing output of titanium dioxide, is a highly competitive project creating virtually no air emissions, using water more efficiently, producing less liquid effluent and imposing fewer planning constraints. The Kemerton project will be of benefit to the environment, the local community, the State, and the Company.

References

1. Anderson, E. M. Environmental Impact Assessment In Australia and Overseas, Department of Arts, Heritage and Environment, July, 1986, p. 2.

2. Clark, B. D., "Preface and Acknowledgements". In B. D. Clark et al (eds), Perspectives on Environmental Impact Assessment. D. Reidel Publishing Company, Dordrecht, Holland, 1984, p. ix.

3. Munn, R. E. (ed) (1979), cited in B. D. Clark et al (eds) Perspectives on Environmental Impact Assessment. D. Reidel Publishing Company, Dordrecht, Holland, 1984, p. 5.

4. United Nations Environmental Programme (1980) cited in B. D. Clark et al (eds), Perspectives on Environmental Impact Assessment. D. Reidel Publichsing Company, Dordrecht, Holland, 1984, p. 5.

5. Battele Institute (1978), cited in B. D. Clark et al (eds) Perspectives on Environmental Impact Assessment. D. Reidel Publishing Company, Dordrecht, Holland, 1984, p. 5.

6. Heer, J. E. and D. J. Hagerty (1977), cited in B. D. Clark et al (eds), Perspectives on Environmental Impact Assessment. D. Reidel Publishing Company, Dordrecht, Holland, 1984, p. 5.

7. Clark, B. D., "Environmental Impact Assessment, Scope and Objectives". In B. D. Clark et al (eds), Perspectives on Environmental Impact Assessment. D. Reidel Publishing Company, Dordrecht, Holland, 1984, pp. 4-7.

8. Ibid, p. 7.

9. Laporte Effluent Disposal Committee, Laporte Factory Effluent Disposal - Report on Disposal Options, Vol. 1 July 1982, p. 9

10. Laporte Steering Group, Laporte Effluent Disposal Environmental Review and Management Programme Stage I January, 1985, prepared by Dames and Moore, p. 6

11. Laporte Effluent Disposal Committee, Laporte Effluent Disposal - Report on Disposal Option, Vol.1 July 1982, p.1

12. Laporte State Government (a) Laporte Industrial Factory Agreement, No. 39, 1961.

13. Laporte Effluent Disposal Committee, Laporte Factory Effluent Diposal - Report on Disposal Option, Vol. 1 July 1982 p.9

14. Environmental Protection Authority (a), Proposed Chloride Process Titanium Dioxide Plant at Australind. SCM Chemicals Ltd, Report and recommendations of the Environmental Protection Authority Bulletin 275, Perth, WA, May 1987, p.8

15. Laporte Steering Group, Laporte Effluent Disposal Environmental Review and Management Programme Stage I. January, 1985, prepared by Dames and Moore, pp.7-8

16. Bestow, T.T. and Hirshberg, K.J., Laporte Factory Effluent Disposal, Vol. 3 Hydrogeology Report No. 2043 December 1980, p.5

17. Laporte Effluent Disposal Committee, Laporte Factory Effluent Disposal - Report on Disposal Option, Vol. 1 July 1982 p.16

18. Ibid

19. Bestow, T.T. and Hirshberg, K.J., Laporte Factory Effluent Disposal, Vol.3. Hydrology Report No. 2043 December 1980, pp.5-9

20. Laporte Steering Group, Laporte Effluent Disposal Environmental Review and Management Programme Stage I, January, 1985, prepared by Dames and Moore, p.9

21. Department of Conservation and Environment, Report and Recommendations by the Environmental Protection Authority Evaluation of Disposal Options for Effluent from Laporte Titanium Dioxide Manufacturing Plant, Perth, WA., Bulletin 137, May 1983, pp.7-8

22 Laporte Effluent Disposal Committee Laporte Factory Effluent Disposal - Report on Disposal Options, Vol 1, July 1982 p.28

23. Laporte Steering Group Laporte Effluent Disposal Environmental Review and Management Programme Stage I. January, 1985, prepared by Dames and Moore. p.16

24. Department of Conservation and Environment, Report and Recommendation by the Environmental Protection Authority. Evaluation of Disposal Options for Effluent from Laporte Titanium Dioxide Manufacturing Plant, Perth, W.A. Bulletin 137, May 1983, p.9

25. Environmental Protection Authority (a) Proposed Chloride Process Titanium Dioxide Plant at Australind SCM Chemicals Ltd, Report and Recommendations of the Environmental Protection Authority, Bulletin 275, Perth, WA, May 1987, p.4

26. Brislin, B.(a) "Extensive underground pollution uncovered. South Western Times, May 14 1985

27. Brislin, B.(b) "Three main sites contaminated at SCM Plant", South Western Times, May 23 1985

28. Laporte Effluent Disposal Committee. Laporte Factory Effluent Disposal - Report on Disposal Options, Vol.1. July 1982, p.24

29. Ibid

30. Ibid, p.25

31. Ibid

32. Ibid

33. Ibid, p.28

34. Environmental Protection Authority (a) Proposed Chloride Process Titanium Dioxide Plant at Australind. SCM Chemicals Ltd, Report and Recommendations of the Environmental Protection Authority Bulletin 275, Perth, WA, May 1987. p.8

35. Laporte Effluent Disposal Committee Laporte Factory Effluent Disposal - Report on Disposal Options, Vol.1, July 1982, p.29

36. Environmental Protection Authority (a) Proposed Chloride Process Titanium Dioxide Plant at Australind. SCM Chemicals, Ltd, Report and Recommendations of the Environmental Protection Authority, Bulletin 275, Perth, WA, May 1987 p.8

37. Laporte Effluent Disposal Committee Laporte Factory Effluent Disiposal - Report on Disposal Options, Vol 1, July 1982, p.30

38. Environmental Protection Authority (a) Proposed Chloride Process Titanium Dioxide Plant at Australind. SCM Chemicals, Ltd, Report and Recommendations of the Environmental Protection Authority, Bulletin 275, Perth, WA, May 1987 p.8

39. Laporte Effluent Disposal Committee Laporte Factory Effluent Disiposal - Report on Disposal Options, Vol 1, July 1982, pp.30-39

40. Environmental Protection Authority (a) Proposed Chloride Process Titanium Dioxide Plant at Australind. SCM Chemicals, Ltd, Report and Recommendations of the Environmental Protection Authority, Bulletin 275, Perth, WA, May 1987 p.8

41. Department of Conservation and Environment, Report and Recommendations by the Environmental Protection Authority. Evaluation of Disposal Options for Effluent from Laporte Titanium Dioxide Manufacturing Plant, Perth, WA, Bulletin 137, May 1983, p.3

42. ibid, p.1

43. Laporte Effluent Disposal Committee Laporte Factory Effluent Disposal - Report on Disposal Options Vol.1, July 1982, pp.54-56.

44. Government Chemical Laboratories, "Investigations of Chemical Treatment of Laporte Effluent", Laporte Factory Effluent Disposal, Vol. 2 1977, p.13

45. Department of Conservation and Environment, Report and Recommendations by the Environmental Protection Authority. Evaluation of Disposal Options for Effluent from Laporte Titanium Dioxide Manufacturing Plant. Perth, WA, Bulletin 137, May 1983, pp.16-19

46. Ibid

47. Environmental Protection Authority (a) Proposed Chloride Process Titanium Dioxide Plant at Australind SCM Chemicals Ltd, Report and Recommendations of the Environmental Protection Authority, Bulletin 275, Perth, WA, Bulletin 275, May 1987, p. 4

48. Ibid

49. Brislin, B. (b) "Three main sites contaminated at SCM Plant". South Western Times, May 23, 1985.

50. Laporte Steering Group, Laporte Effluent Disposal Environmental Review and Management Programme Stage I January 1985, prepared by Danes and Moore p. 2

51. Ibid, pp. 42-43

52. Ibid, p. ix

53. Ibid, pp. x-xi

54. Ibid

55. Environmental Protection Authority (a) Proposed Chloride Process Titanium Dioxide Plant at Australind. SCM Chemicals Ltd, Report and Recommendations of the Environmental Protection Authority, Bulletin 275, Perth WA, May 1987 p. 4

56. Stearns, Kinhill, Proposed Chloride Process Titanium Dioxide Plant, Stage II Environmental Review and Management Programme, 47 Burswood Road, Victoria Park, WA, November, 1986, p. 14

57. South West Development Authority, Draft Landuse Plans for the Leschenault Coastal Park and the Kemerton Community Park: for Public Comment. November 1985

58. Ibid, p. 3

59. Stearns, Kinhill, Proposed Chloride Process Titanium Dioxide Plant, Stage II Environmental Review and Management Programme, 47 Burswood Road, Victoria Park, WA, November, 1986, p. iii

60. Ibid, pp. iii-iv

61. Ibid, pp. 32-38

62. Ibid, pp. 27-32

63. Ibid, p. 65

64. Ibid, pp. 73-75

65. State Government (b) Pigment Factory (Australind) Agreement Act, No. 92, 1986

66. Environmental Protection Authority (a) Proposed Chloride Process Titanium Dioxide Plant at Australind. SCM Chemicals Ltd, Report and Recommendations of the Environmental Protection Authority, Bulletin 275, Perth WA, May 1987 pp. i-iii.

67. Ibid

68. Ibid, pp. 3-7

69. Ibid, pp. 9-10

70. Ibid, pp. 11-14

71. Stearns, Kinhill, Proposed Chloride Process Titanium Dioxide Plant, Stage 2 Environmental Review and Management Programme, 47 Burswood Road, Victoria Park, WA, November, 1986, p. 16

72. Environmental Protection Authority (a) Proposed Chloride Process Titanium Dioxide Plant at Australind. SCM Chemicals Ltd, Report and Recommendations of the Environmental Protection Authority, Bulletin 275, Perth WA, May 1987 p. 15

73. Ibid, pp. 56-62

74. Ibid, pp. 62-84

75. State Government (c), Pigment Factory (Australind) Agreement Ammendment Act, 1987

76. Environmental Protection Authority (b) Proposed Chloride Process Titanium Dioxide Plant at Kemerton. SCM Chemicals Ltd, Report and Recommendations of the Environmental Protection Authority, Bulletin 283, Perth WA, July 1987 p.1

77. SCM Chemicals Ltd, Proposed Chloride Process Titanium Dioxide Plant at Kemerton, Notice of Intent June 1987, pp.3-4

78. Environmental Protection Authority (b) Proposed Chloride Process Titanium Dioxide Plant at Kemerton. SCM Chemicals Ltd, Report and Recommendations of the Environmental Protection Authority, Bulletin 283, Perth WA, July 1987 p.1

79. SCM Chemicals Ltd, Proposed Chloride Process Titanium Dioxide Plant at Kemerton, Notice of Intent June 1987, p.15

80. Environmental Protection Authority (b) Proposed Chloride Process Titanium Dioxide Plant at Kemerton. SCM Chemicals Ltd, Report and Recommendations of the Environmental Protection Authority, Bulletin 283, Perth WA, July 1987 pp.1-3

81. Ibid, pp.35-45

82. Ibid, pp.46-48

83. Ibid, pp.53-63

84. Ibid, pp.65-70

85. Ibid, pp.71-75

86. Ibid, pp.75-78.

LIST OF ABBREVIATIONS USED

CALM	-	Department of Conservation and Land Management
CEO	-	Chief Executive Officer
DCE	-	Department of Conservation and Environment
DMA	-	Decision Making Authority
EIA	-	Environmental Impact Assessment
EIS	-	Environmental Impact Statement
EPA	-	Environmental Protection Authority
ERMP	-	Environmental Review and Management Programme
HAZOP	-	Hazard and Operability Study
LIMA	-	Leschenault Inlet Management Authority
LSG	-	Laporte Steering Group
NOI	-	Notice of Intent
PER	-	Public Environmental Report
PWD	-	Public Works Department
SES	-	State Emergency Service
tpa	-	Tonnes per Annum
WA	-	Western Australia

BIBLIOGRAPHY

Anderson, E.M. Environmental Impact Assessment in Australia and Overseas, Department of Arts, Heritage and Environment, July, 1986.

Bestow, T.T. and Hishberg, K.J., Laporte Factory Effluent Disposal, Vol. 3. Hydrogeology Report No. 2043. December, 1980.

Brislin, B. (a), "Executive underground pollution uncovered". South Western Times, May 14 1985.

Brislin, B. (b), "Three main sites contaminated at SCM Plant". South Western Times, May 23 1985.

Carbon, B., pers. comm. August 17 1987.

Clark, B.D. (a), "Preface and Acknowledgements". In B.D. Clark **et al** (Eds.). Perspectives on Environmental Impact Assessments. D. Reidel Publishing Company, Dordrecht, Holland, 1984.

Department of Conservation and Environment; Report and Recommendations by the Environmental Protection Authority: Evaluation of Disposal Options for Effluent from Laporte Titanium Dioxide Manufacturing Plant, Perth WA, Bulletin 137, May 1983.

Environmental Protection Authority (a) Proposed Chloride Process Titanium Dioxide Plant at Australind SCM Chemicals Ltd. Report and recommendations of the Environmental Protection Authority, Bulletin 275, Perth WA, May 1987.

Environmental Protection Authority (b) Proposed Chloride Process Titanium Dioxide Plant at Kemerton, SCM Chemicals Ltd. Report and recommendations of the Environmental Protection Authority, Bulletin 283, Perth WA, July 1987.

Environmental Protection Authority (c) A Guide to the Environmental Protection Act 1986, February 1987.

Government Chemical Laboratories, "Investigations of Chemical Treatment of Laporte Effluent", Laporte Factory Effluent Disposal, Vol. 2, 1977.

Laporte Effluent Disposal Committee, Laporte Factory Effluent Disposal,
- Report on Disposal Options, Vol. 1, July 1982.

Laporte Steering Group, Laporte Effluent Disposal Environmental Review and Management Programme, Stage 1, prepared by Dames and Moore, January 1985.

Parker, D. pers. comm., 25 August, 1987.

Parker, D., Media Statement, Minister for Minerals and Energy, 3 June 1987.

Porter, C., "Environmental Assessment - WA and other Australian States", Proceedings from the Environmental Impact Assessment and Procedures Public Seminar. Department of Conservation and Environment, WA, Bulletin 142, August 1983.

South West Development Authority, Draft Landuse Plans for the Leschenault Coastal park and the Kemerton Community Park: for Public Comment. November 1985.

State Government (a) Laporte Industrial Factory Agreement, No. 39, 1961.

State Government (b) Pigment Factory (Australind) Agreement Act, No. 92, 1986.

State Government (c) Pigment Factory (Australind) Agreement Act, No. 87, 1987.

State Government (d) Environmental Protection Act 1986, No. 87, 1986.

Stearns, Kinhill, Proposed Chloride Process Titanium Dioxide Plant, Stage II, Environmental review and Management Programme, 47 Burswood Road, Victoria Park, WA, November 1986.

In the preparation of this paper, key players in the environmental history of the titanium dioxide plant at Australind were interviewed to try to gain a better understanding of the process of EIA in WA as seen by those involved. The emphasis has been on how EIA works in WA and in particular how it has worked in relation to the Laporte/SCM plant. The transcripts of these interviews are included in the following pages as Appendices 1 to 4. These Appendices have been included to present the various perspectives of the people involved. No attempt has been made to analyse or discuss these perspectives, rather they have been presented for the reader's interest.

APPENDIX I

Interview with Barry Carbon, Chairperson of The Environmental Protection Authority on 17th August, 1987

I would like to start talking about culture and interaction with EIA by highlighting the fact that every nation has a different culture. It is very important that we do not look at the literature and the systems other people use, and then decide we can or should translocate other peoples' experience to ours. Similarly, it is also important for us not to look at another system and say that it is different from ours, therefore it is better or it is worse. It is my estimation that most places have a system that is appropriate to their culture, and that there is a range of socio, politico, legal, cum cultural reasons why we have those systems and most of us have systems appropriate to us. There are some classic examples; places like the United States or Japan where society has come to have expectations which are based on legal systems of rules.

The model that we have just been discussing uses a basis whereby a prescribed set of measurements are taken on a prescribed set of pollutants or emissions; the performance of the company is judged on the basis of meeting those set of standards or emissions which are uniform across all companies. It really does not matter whether you are manufacturing sulphur dioxide or not; you may be prescribed like everybody else to take measurements of it.

The alternate model which is being generated and evolved through Europe is based on the best 'something' technology - best practical, best economic or best available. Companies are expected to set certain forms of control depending on what sort of control methods are available at the time that the project goes ahead. Essentially society says to a company, "if you are trying as hard as you can or as hard as we expect you to try, then you are acceptable".

That has worked in many instances but also fails at "both ends". Even if everyone tries hard enough, they might not be effective enough in terms of their impact. In other words their cumulative impact or even their individual impact may be greater than the assimilative capacity of a certain environment. The best technology may not be good enough to protect the environment. The other end where it fails is that it requires people to try as hard as they can, and they may have to try even harder each time there is available a change in technology. It also requires them to try as hard

as they can even if they go to a remote location despite where "going to a remote location" may be the best way to protect the environment. This is a negative incentive associated with site location, and really site location is often the most critical of issues associated with environmental impact.

So we have different models that are available, according to the culture in which one originates, and we have been able to see in the history of the last 20 years of development in Western Australia that the company's that have come to here from different cultures, often expect us to fit a role mode that is associated with the culture from which they have come. We have a culture here which is based on the very special privilege of doing assessment on each of the major proposals which comes to us and asking the question about each of those - "how can this proposal be made environmentally acceptable? - Acceptable in the term that its impacts do not exceed the assimilative capacity of the particular environment in which it is located ". This is the objective - to try to find a way to make the projects fit the assimilative capacity and the assimilative capacity may be the capacity of either the natural environment or the assimilative capacity in terms of the impacts on its people.

The Laporte project was in fact discussed at the very first meeting of the EPA in WA and has been, I would suspect, the most frequent "return visitor" to EPA. The frequent topics of discussion have been twofold. Firstly discussion on the impacts of waste disposal from the sulphuric process but also increasingly the difficulty in coping with the separation between industry and what is potentially an attractive living environment. As people have moved in closer to the plant we have had problems associated with air emissions. The first instance was impacts on the towns and that went through an environment review process and the company was asked to make some variation to its height of emission stacks.

So here we have in 1987 a time when the company finds it attractive to be expanding because it has large markets and a time when it is economically attractive to go to a different technology and a time when the State has been reviewing its options associated with long term disposal of the sulphuric acid residues - disposal in terms of where does one go to because the Peninsula will be filled up within about 3 to 4 years; and in terms of the dollar cost associated with it and in terms of the ongoing environmental cost. That is the long term environmental cost associated

with sterilising significant parts of a special piece of the environment along the coast.

The most recent role of the EIA, I suppose, started 18 months ago when the company was involved with agencies of the State in reviewing the options available in waste disposal. The next point I would like to make about EIA in WA is that it does not belong to the EPA as a process, very often the agents associated with it are the proponent plus other agencies - other agencies who have as a subsidiary, but important part of their objective, environmental objectives. For example, the Department of Mines in the State has a primary objective to promote mining and exploitation of minerals but as a secondary objective, it has the objective associated with restoration of qualities of land after mining. Rehabilitation, if you like, and that is now seen by society as a responsibility part of the mining industry.

The Department of Resources Development, Department of Conservation and Land Management, Department of Mines and the departments associated with Water Resources all were involved in looking at alternatives to waste disposal and put together a Stage 1 ERMP. The Stage 1 ERMP said "there are options we have" and they went right through from neutralisation of the acid, pumping to a remote location, disposal in the ocean, deep disposal by deep well injection. All of those were canvassed, their financial and environmental consequences were looked at, put out for public comment, the EPA provided a preliminary advice to Cabinet on that and everyone said, "let's sit back for six months and look at it". The environmental objectives had been stated by the EPA but not the means by which those objectives should be met. It then went through a process where the companies had examined the options and the State and they had financial negotations at a preliminary stage and came to a balance which said the thing that would be most attractive is to go away from the sulphate technology to chloride technology. This reduces quite significantly the environmental impact in terms of air emissions, quite significantly reduces in terms of waste and the nature of waste which needs to be dealt with but then raised quite different elements of environmental concern. I guess that it took us from environmental impact which is an ongoing one at a low level associated with the sulphuric process through to an environmental impact which was probably very small from a view of ongoing impact but had a risk associated with that. What if? What if something goes wrong? and does that cause an excessive risk? So we went through the process of assessing that risk and found that although it would be

possible to use the existing location for the chloride process, there would need to be extremely tight and stringent requirements placed on the company in order to make it safe enough. It still is an option that it might end up being the attractive thing to the company - that given a very tight set of controls, the company could go ahead and build a plant of a restricted size and a restricted impact on its existing site using the chloride process. I can not remember the number of recommendations the EPA made, it was quite a large number and they were very specific and much more stringent that any we have placed on any proposal we have looked at. I guess the feature about that was that it was possible to look at this specific project and that specific location and say, "In order to make that proposal meet the assimilative capacity of that environment; that is both the natural environment and the people; what is necessary to impose on it?". Now if we had taken the approach of the best practical technology, it is my assessment that the best practical economic technology would have said to you, "In doing this, you are going to end up with a level of risk which is higher than what the EPA would find acceptable?". If one had used the approach that says meet x, y or z levels of emission then you would not have had a mechanism that could properly take into account the "what if anything goes wrong" approach. This enabled a recipe to say to the company, and to the Government; "it is possible on that site but you have to meet A, B and C levels of objective and you work out exactly how you are going to do it and how much it is going to cost"; and they did, and they came back and said, "We are not very attracted to that". The company was not very attracted because the costs associated with the project were quite high and they came back and said, "We still want to go down a chloride route and we still find it attractive to have markets out there but we really can't afford to have that effluent control - what do we do?". There was the iterative process that went on which said if you need to generate more capital, more income to pay for your capital, the appropriate way may well be to have a large plant but you can not do it at that site because of the environmental constraints. An alternative location may be available where you do not have the same constraints, i.e. the assimilative capacity is different and where the conditions that were recommended by the EPA may be accomplished. Now, again we have the priviledge of looking at the individual project, and again by moving to a place that has a separate, a different assimilative capacity because it does not have people living around it (and that is primarily the impact there) it was possible to use the technique that we have here to come up with a proposal which the EPA recommended as being environmentally acceptable. It

is my belief that the company and the State equally find this proposal attractive from their points of view, and they will mutually meet their own objectives. What the EPA has said, is that if the project goes to this place with a different assimilative capacity, it will not be necessary to spend as much money proportionally on environmental management; the assimilative capacity will be different, the plant can be larger and therefore the company can generate more money to pay for it. I guess it has an attraction to the State because it means more jobs, more revenue generated and of course the environments are protected.

Now it is my belief that we are now sitting on a project which I think the society finds attractive, which certainly the EPA recommended as environmentally acceptable, I believe the Government finds it attractive and I believe the company does too.

I have some criticisms of the process that we have been involved with and one of those is that it can be awfully slow sometimes. It would be much quicker to say, "look there are the rules, take it or leave it!". Certainly, from the point of view of resources in my department it would be much easier to say, "there are the rules, we are going to control you from the point of view of the emissions that you have and some other standards that we put on you." This particular proposal has been a slower one; I am not sure, however, that the disadvantages do not fade into insignificance completely in this case.

The proposal that we have before us now is that the wastewater be managed by pumping it to the ocean. You will recall in our recommendations we suggested a couple of ways we would find acceptable; certainly on a departmental basis, but there has not been a legal agreement signed on this, I don't believe. That is a proposal that the EPA would find acceptable, it really is about a third the concentration of seawater anyway that is being pumped and we have ongoing discussions with the company now about the method of getting that water to the ocean and having a minimum impact. This ranges from pipelines which are buried or not buried as through the environment to get there and once it has got to the ocean is it better to have a pipelines that protrudes out into the ocean, or is it better in fact to inject it into the soil right where the ocean meets the land?, and that may be the way you minimise environmental impact. That's not totally finished but there are any one of three or four alternatives or methods which the EPA would find acceptable to reach its objective. Remember that the EPA's primary concern is to say, "that's the objective, you come

back and tell us the way you want to meet it". It is a very big trap to fall in to say, "we want you to go and do this in order to meet the objective" because if they go and do that and it doesn't work, they are still meeting the requirements for the law and the State picks up the cost associated with fixing it up. It is very important that we do not tell them what they have to do to achieve, we tell them what to achieve - then the onus is on the proponent.

APPENDIX II

Interview with David Parker, Minister for Resources and Energy, 25th August, 1987

Q. How do you feel about the EIA process in WA?

D.P. I think in general terms it is very good, it seeks to be flexible and as simple as possible. I think it does not impose rigid legal criteria which have to be met which can result in extensive legal challenges. I think that we get the best of both, making sure that projects are assessed properly and at the same time, avoiding the excessive legal deeds and extraordinary delays that take place, for example in the United States where there is a more legalisic system. Not only do you have the EIS process but you have the legal process that almost inevitably seems to follow and that has been avoided in Western Australia. I think another good aspect of it, is that it makes absolutely clear that the EPA is an advisor to Government and this advice, of course, is very important advice and it needs to be taken very seriously and it needs to be made public so that the public can see what the advice is. But in the final analysis it is the Government that makes the decision. I think that is very important for the democratic process, that the Government makes the final decision rather than a separate non-accountable body which again is the case both in some other states of Australia and other parts of the world.

Q. From your point of view, do you think that EIA is achieving its objective? It is not taking too long or going about it in a roundabout sort of way?

D.P. I think we could all complain about individual incidents that make us frustrated and so on and I guess because of the nature of my portfolio I come up against the EIS or ERMP process more than most people. I wouldn't say that it is absolutely perfect but I think in general terms it isn't long; I think that it has shown we can deal with things quickly when they need to be dealt with and at the same time it has done them thoroughly, cooperatively and, in general terms, it is a very positive process. At the same time, the public has got procedures to seek the protection and the information it needs.

Q. Do you think the EIA process is well meshed with the development side of Government?

D. P. Yes, I think that the way in which projects generally happen, whereby project proponents, for example in my area, in the resources development area, come to me and either they or I put in a Notice of Intent on their behalf. Then the EPA will examine it and its officers will talk it through with my officers and the company, work out a level of assessment that they think is appropriate and then require the company to act accordingly. I think in general terms there is a good meshing and a good understanding on the part of the EPA of the commercial constraints a lot of these companies work under in respect of timing.

Q. Do you think the EIA is a hindrance to development at all?

D. P. I think it depends whether you take the short or the long-term point of view. If you take the short-term point of view, then you can say " yes, it is" because obviously if you could just go ahead and build anything you wanted to, then it would be much easier than if you have to go through these sorts of processes. But I think long-term it is in fact an assistance for two reasons: The first is that almost any resource development project you care to talk about is dealing with limited resources (limited as to things like ore bodies or energy or land availability or things like that) and so you need to have an overall community benefit to look at it from that point of view. Secondly, I think that the public might, for a little while, accept development projects going ahead without consideration of the environmental impact but sooner or later they develop a public resistance to that and I actually think that it is in the interest of developers, long-term, to make sure that their projects are environmentally acceptable and go through the process so that in the long term the public accept those sorts of things. So I think that although you will meet developers who say there shouldn't be an environmental impact process over short term developments, I think you will find most would agree for long-term developments that it may be in their interests.

Q. John Bailey and Peter Newman both are strong supporters of the idea that EIA done properly, benefits all parties concerned. To what extent do you agree or disagree with this?

D.P. Well, the last few comments I have made indicate that I agree with it. Again, I think it depends very much as to what you are talking about. There are some people who say that anything that has any impact on the environment at all is to be deplored but if you say that, and if you agree with that, then of course it must be deleterious to development as well as, I believe, not very beneficial to the environment. But if what you say is you are managing risks, you are dealing with competing land uses, you are dealing with making priority decisions which is really what it amounts to most of the time, then I think it is of great benefit to all parties.

Q. Is the SCM outcome acceptable to you?

D.P. Oh yes, not only acceptable but fantastic! I regard it as one of the major achievements of the Government and of myself as Minister for Resources Development from both a developmental and an environmental point of view. If you look, starting from the environmental point of view, we have a project which has been operating for 25 years in a location which if it was ever acceptable, and I doubt whether it ever was, certainly it was not acceptable in today's day and age. You had substantial degradation in rare and increasingly in demand for other uses, sand dune country and visual degradation in terms of the pipeline across the Leschenault Inlet. You had substantial emissions, both air and water-borne, and you were producing based on outmoded and noncompetitive technology. We have now changed all of that to a plant which has virtually no emissions at all and certainly no pollutant emissions by air, almost no water-borne emissions, a high tech industry, fully competitive and we will be able to stop the degradation in the sand dunes, remove the pipeline and remove the emissions that are upsetting the people at Australind. So from the environmental point of view, I think, that it is excellent.

From a developmental point of view we have got, instead of upgrading our levels to the tune of 36,000 tpa, the product will be going out at 70,000 tpa so

we have doubled our output which is much more than doubling the value added which comes to Western Australia. We have got a highly competitive international market, probably the most competitive and one of the biggest in the world able to operate freely in a good environment, and we are taking advantage of market opportunities and showing the world that we can do it very quickly, given that a lot of these similar sorts of plants, even in countries which are pro-development like Taiwan, Singapore and Korea, have faced major holdups. I think this is a major benefit to the State.

Q. One of the criticisms of the EIA process is that it is too slow. Have you any suggestions how it could have been done quicker?

D.P. Two points. Firstly, there is an inevitable slowness if you involve the public and I think you just have to say that's one of the costs of a democratic society. You do have to have some degree of public involvement, to what degree that should be and whether there should be all sorts of other legal rights as there are in America, because of course then you make it very slow. Projects do not get approved for ten years in America because of the process that they have. Here that (public involvement) tends to slow it down. However, I think the extent to which there is knowledge of the operation and knowledge of the environment obviously speeds the process up. One of the things we were able to do at Kemerton was, although the environmental process for the new plant at Australind had taken a long time, because of the knowledge we acquired about it we were able to make quick decisions about Kemerton. In the same way, because we had done a lot of study about Kemerton for the aluminium smelter, we were able to use that knowledge to make a quick decision at Kemerton and marry the two together. Knowledge is the thing that results in speed and whether that is because of greater cooperation between industry and Government and in the different Government departments involved in the environmental process. I think those essential things would speed things up, together with the political will to do it, and I think on this occasion, certainly in relation to the Kemerton operation, that the political will

was there to do it very speedily both from myself and Barry Hodge. Nobody could complain that the Kemerton proposal took any length of time.

Q. Do you think it could have been done any better way?

D. P. I don't think the Kemerton site could have been done in any better way, but in looking at the Australind ERMP there was certainly a lack of information through to the public and I think the chemical industry in general has well and truly fallen down in explaining to the public what it is all about. There is a lot of fear; fear of the unknown, in many cases quite irrational and wrong fears but fears nevertheless, and quite generally ones about living near a chemical plant and what that means. Things like Bophal have all contributed to that fear and I think if we had been able to address that earlier on in the piece, we probably would have had a different social and political environment. Again, I think there is no substantial error other than that but obviously as it turned out the company wanted to build on a particular site. They were not at first prepared to look at a different site and it was not until they did become prepared to look at a different site that we were able to give a satisfactory solution.

Q. Is there anything else relevant that you would like to say about the project?

D. P. Of all the sorts of similar things around the world, it is one of the great environmental success stories and it is a great example of how when you have got, let's say, the political will and you have got organisations that know each other and work together like ourselves, the mining resolution centre of the Government and the environmental protection centre all can win the confidence of the private sector company. We have also been able to do what is very good for the State and turn a community which was very hostile to a development around to one that is now very supportive of it. I think that it is really a major achievement.

APPENDIX III

Interview with Barry Hodge, Minister for the Environment - 9th September, 1987

Q, How do you feel about the EIA process in WA?

B. H. Well its early days yet since the changes were introduced. I take it you are referring to the new procedures that we brought into operation on 20th February this year? My initial feeling is that they are working very well indeed. They have generated a lot of extra work, particularly for officers in the EPA and for myself but never-the-less I think they are a great improvement on the previous informal approach that was taken and I am very pleased so far.

Q. What do you think of your power in Division 2, Part IV of the new Environmental Protection Act?

B. H. Well, I think the whole new act is pretty good seeing I had a large part in writing it. I think that the crux of it is in the assessment procedure and we deliberately framed the act so as to rectify the error in the previous legislation. That is, the Minister for the Environment was virtually a ceremonial position. In the past the Minister had virtually no power or role whatsoever and apart from that, more importantly, the EPA had no mechanism to ensure that any conditions or recommendations made were abided by. The company was free to do as it chose; it did not have to take any notice of the Minister for the Environment or the EPA. Of course that that has been a fundamental change long overdue and I think that it is absolutely fundamental to the legislation. Just in recent times I have been exercising that power in setting conditions on various projects.

Q. From your point of view, do you think that the EIA process in WA is achieving its objective?

B. H. As I said in answer to your first question, it is very early days because it has only been in operation since February this year. But at this early stage I am very optimistic that its working well and it will

achieve what we set out to achieve. As I say, I think that it is a bit early to make any rash statements but I think that it is going well.

Q. How about prior to the new act - do you think that it was achieving its objective then?

B. H. I think that the EPA did a stirling job considering the lack of power they had but I think there was a real need for that position to be legitimised and put into statute. The EPA were using just moral persuasion in the past to try and persuade companies to abide by the conditions that they were setting. Now, of course, it is really a matter of the law and these companies must be subject to assessment and then must abide by the conditions that the Minister sets. I think that is a vast improvement so I think we owe the EPA a debt for struggling on over the years when it did not really have the statutory power. It achieved quite a lot and probably a number of projects proceded on a much better basis than if the EPA had not been there. Nevertheless, I do not think there is any substitute for having the real statutory power.

Q. Do you think that EIA is a hindrance to development?

B. H. Oh yes, I suppose, to be honest you have to say that any planning, environmental, health checks or local government check; or anything can be a hindrance to development. I think that it is a justifiable and legitimate hindrance but obviously some developers would argue that we should not have any sort of planning hindrance or environmental hindrance or anything else and of course I would not agree with that. So, I guess while in the strict technical sense, yes, it does delay and probably hinder some entrepreneurs and some developers, nevertheless I think that is a legitimate function and I do not make any apologies for it. I do not think there is ever any unnecessary or protracted hindrance by the environmental process.

Q. John Bailey and Peter Newman are both strong supporters of the idea that EIA done properly, benefits all parties concerned. To what extent do you agree or disagree.

B. H. Well, I am not sure the developers; the proponents; would necessarily agree with that. I think probably many of them would debate that issue with you and would not agree that it is an assistance to them. Some of the more enlightened and progressive ones would agree with you and say they get a lot of benefit out of this process. I have one developer in mind at the moment who is threatening to cancel an entire project because the EPA has insisted on subjecting his project to an assessment procedure. He is demanding an appointment with me and is going to go to the media and is threatening to cancel his whole project. So, certain developers see it in different ways.

Q. Is the SCM outcome acceptable to you?

B. H. Yes, Well, we are still, in fact, having some negotiations right at the moment with SCM tying up a few loose ends on the project and I can't go into those because they are confidential. Yes, I am happy with the way the SCM project, in particular, has developed.

Q. One of the criticsms of the EIA process is that it is too slow. In light of the SCM situation do you have any suggestions on how it could have been done any faster or perhaps any better?

B. H. Well, I haven't heard the 'too slow' criticism levelled at the SCM project. The criticism I have had is the opposite. I directed the EPA to report to me by a certain date on the proposal that the plant be established at Kemerton rather than Australind. I directed the EPA to report within a specific time limit; it was the first time that part of the act has been used; and there was a little bit of criticism from the conservation movement to the Government for in fact doing that. The conservation movement were advocating that there be another full length public procedure on the assessment of the Kemerton site. So I haven't heard the accusation that we have been too slow or that we have unnecessarily delayed the assessment of SCM. But certainly, as I said before, some developers and some local authorities from time-to-time do complain that the assessment procedures delay and bog down projects and that

people who have got special financial arrangements are at risk of having those financial arrangements collapse as backers withdraw or interest rates alter because of lengthy delays. Now, I deny that there are any lengthy delays and always ask those people who make that accusation to represent the evidence to me and I will personally investigate it. If there have been undue delays then I will take some action. Each time I ask people to provide specific examples of undue delays, the evidence never seems to come forward. I do have the power under the Environmental Protection Act to direct the Authority to report to me by a certain date so if I feel they have been tardy on a particular matter then I can direct them to report by a certain date. I do have the power to rectify that problem.

Q. I am aware that the assessment of the Kemerton proposal was comparitively rapid. What I was hinting at in the question was the fact that the process has been going on for some 15 years or so; since 1970, I suppose, when alternatives to the waste disposal technique on the dunes were first looked at and it seems to have been very slow since then.

B. H. I do not think that it is fair to refer to that as the EIA procedure. We have had new procedures since February this year. Prior to that there was an informal arrangement under the old Environmental Protection Act. The assessment procedures only come into play when a new project is put forward and Laporte as it was then was not a new project so it was not formally put forward as a new project to be assessed. But if you are referring to the general environmental problem down there of dumping the effluent into the sand dunes; that is a problem we have had for years which we inherited from the previous government. There was a deliberate policy that was embarked upon by the Court Government and we were only in office for a brief period before we tackled the problem and have virtually come up with a resolution to it. So I think there can not be much criticism of this Government in respect to that because we tackled it very early in the piece and to the credit of David Parker, he managed to persuade that company to take action that is going to bring

about a cessation of the dumping. I am really pleased with the progress we have made in respect to that.

Q. Is there anything else that you would like to say about the SCM project?

B. H. Ultimatley I would like to see that plant removed entirely from the Australind site and the bulk of that area used for residential development. That is what I will continue to work for. I think that is an inappropriate location for a large chemical plant and I think ultimately we have to persuade that company to remove its whole operation and clean up the area and to turn as much as possible over to residential development. That is my long term objective.

APPENDIX IV

Interview with John Leach, General Manager of SCM Chemicals Limited, 2nd October, 1987

Q. How do you feel about the Environmental Protection Authority's assessment of the ERMP Stage II and subsequent NOI? I am not talking about the EPA's conclusion and recommendations but about the environmental impact assessment process. For example, was the process too slow?

J.L. 1. The process can take too long. We could demonstrate the speedier processing of approvals for more hazardous plants in more built up locations through the UK system. In the United States it would be reasonable to expect that we would have obtained approval and built the plant in the time it has taken to obtain approval in Western Australia. For organizations with multiple choice locations and facing particular market opportunity windows, resource allocation will be channelled to those locations with faster approval processes, other factors being held reasonably constant. Often these other locations have the added advantages of lower factor prices of inputers, thus putting Western Australia at a significant disadvantage.

2. The process has an unfair bias towards the EPA and its Minister. For example:

   (a) Time constraints are placed upon all parties except the time the Minister can have to determine appeals and the time the EPA has to consider and report on the proposals.

   (b) The appeals procedure is based on the same people who have made the original recommendations. Natural justice will always be questionable under such an arrangement.

3. The EPA have a lack of expertise in assessing some of the aspects of projects, particularly the assessment of risk.

This requires considerable technical knowledge and experience in handling data. It is not possible to assess risk by the simplistic measurement of the exposure of individuals. The EPA are in danger of sanctioning projects of significant risk if they do not acquire expertise in the area of project assessment.

4. The system calls for more and more detailed information in order that EPA can make an assessment. The type of information required is not normally available until a project is well down the design track.

   The detail of information being requested is right and proper for full project assessment but NOT at the initial stage of a project.

   It is likely that many proponents will not spend the money to provide detail in the depth required simply for an ERMP to have a project rejected on non-objective grounds.

5. The EPA seem to be attempting to be all things to all men. Satisfy proponents, satisfy the politicians and satisfy the public. This is not possible and as a consequence they lose some of their objectivity.

6. The system is biased against the proponent in that once a negative recommendation is published it is unlikely that Government or others will fight for a change.

7. The concept of an initial environmental review undertaken quickly and involving all parties is good, but the present system is getting too detailed and is rapidly becoming a full project assessment and licencing system at the first stage. There needs to be interaction between the proponent and the relevant decision making authorities to develop a document which addresses the main issues. Different people are probably trying to use an ERMP for different purposes, not all of which are compatible with a document which in effect is a planning document and not detailed proposals.

Q. Do you think the requirement to undergo environmental assessment helped or hindered your company to achieve your objective?

J. L. 1. The system as currently being administered has without doubt hindered the project. It has taken 2 years to get initial approval. The plant should have been in operation now.

2. I believe that most companies, ours included, would voluntarily do all the things that are necessary for the ERMP and satisfied itself of the projects environmental impacts without the long bureaucratic system we operate. For example:

(a) We did our own risk analysis without the EPA's requirement.

(b) We would only discharge clean water to the Collie.

I can think of only one thing that the system has contributed to the project - allowing ocean discharge instead of Wellesley River.

Such lengthy procedures are a drain on company's resources of manpower and finances.

Q. Given that the ERMP Stage II was available for public review whereas the NOI received only limited public exposure, what are your views on the involvement of the public, particularly the local community? For example, do you believe that public involvement has led to a greater community acceptance of your company's proposals?

J. L. No. I believe community involvement on the scale seen in this area has led to a lot of unnecessary misunderstanding and emotion. The issues of risk and community concern brought forward by many people were masks to give face validity to particular individual interests, such as land sub-division potential.

Evidence which was available to the EPA Department officers, and which would have reduced community concern, was not released into the public domain.

This release would have reduced the exaggerated misconception of the hazards associated with the plant.

The EPA appears prepared to listen and publish recommendations on the smallest of public opinions. This gives a biased weighting to the view of generally minority groups.

In politics of social choice it is difficult to distill into a group purpose the divergent private objectives of the community. Consensus will not necessarily emerge from conflict, as differences will not always be resolvable unless there is a firm set of rules for their resolution. The current review process does not provide these rules.

Q. Can you suggest any ways in which the process could have been improved?

J.L. 1. There should be more discussion between the EPA and proponents at all stages in order to reach compromise solutions rather than the confrontation approach of waiting for recommendations and then appealing.

2. The EPA should concern itself with an initial, quick, <u>OBJECTIVE</u> technical assessment of a project. It should not involve itself in the public (political) or economic benefits or disadvantages of a project. It should not address itself to passing opinions based upon non technical criteria.

   Technical, objective, assessments should then be argued with Government, public and proponents on the economic benefits and environmental impacts of a project.

   The EPA is currently usurping the role of the Government or politicians in making project decisions.

3. The EPA must acquire technical competence for its evaluation division.

4. The appeals procedure must be made fairer and more objective.

5. If quick, objective technical assessments are made of a project this will speed up the process. It is imperative that the system is shortened. It should be the objective to have an EPA assessment, even on a major project, completed in 6 months

6. The terms of reference for the EPA need refining so that they stop trying to be all things to all men and take on the role of objective technical environmental assessors.

The future economic well being and wealth generation of the State will be significantly impaired unless changes are made. The inordinate delays, the lack of objectivity in assessment and the biased appeals procedure will lead to a refusal by developers to put forward projects in this State.

It should be remembered that in these days of deregulated finance, investors have many places in the world where they can make their investments. WA could soon become a "no go" area unless significant improvements are made to the current system.